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PRINCIPAL TRACKS OF SOUTHERN HEMISPHERE EXTRATROPICAL CYCLONES

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Two years of Southern Hemisphere synoptic charts completed in Boston, Mass., under the Southern Hemisphere Project of the U. S. Weather Bureau and charts completed more recently, by the South African Weather Bureau [1], have made valuable new source material available to investigators of weather patterns south of the equator.

The following is a brief resume of the source of data and methods used in the determination of storm tracks shown on each bimonthly chart (figs. 1–3). Synoptic charts used for these provisional Southern Hemisphere storm tracks were prepared by the South African Weather Bureau [1]. Daily charts for the period January 1951 through November 1953 were used. All depressions of an intensity great enough to indicate they might maintain their identity for a few days were defined as storms. The positions of all storm centers above latitude 30° were taken from the daily synoptic charts and entered on Southern Hemisphere charts, on a monthly basis, as patterns of dots. Storm tracks were then drawn through axes of maximum concentration. To supplement this method, individual storm tracks were traced for all months of the year.

Gibbs [2] made a similar count in the Southern Hemisphere for the months of July 1949 and January 1950. He noted "the location and central value of all pressure systems having a closed isobar." To get an idea of how much influence the definition of "storm" or "low pressure center" would have on the storm count of the two separate investigations (differences in annual variation and source of data must also be considerations), a few comparisons were made of storm counts and storm positions. The count of low pressure centers for July 1949 and January 1950 (less depressions appearing below 30° latitude) was 15 percent higher than the average count for the three Julys and three Januarys included in this study. It was found that July storm counts above 30° latitude outnumber January storm counts by 13 percent.

No concerted effort was made to determine areas of cyclogenesis. However, the origin of storm tracks that begin outside of the circumpolar trough agree in general with the cyclogenetic regions outlined by Vowinckel [3]. Storms spawned in these areas usually move in an east-southeast direction toward the circumpolar trough. Due to topographic, thermal, and other factors, certain areas are preferred terminal points for the life histories of cyclonic storms. In the Antarctic region, the Ross Sea seems to be the outstanding "cyclone graveyard."

Storm tracks reach their maximum poleward displacement during the summer season and it is logical to expect a greater number of storm centers over the Antarctic Continent at this time than during any other season. Surface data used in this investigation [1] indicate only one area where storm centers appear well inland to any marked degree. This area, between the Ross and Weddell Seas (Marie Byrd Land and Edith Ronne Land), is well elevated in the coastal region with at least one peak rising to the 20,000-foot level. This barrier discourages poleward movement of storms near the outer limits of the continent, so apparently most of the storms go inland in the Ross Sea area and finally dissipate inland, or in some cases maintain their identity into the Weddell Sea region.

Definite areas of low storm frequency were noted along the low pressure trough that encircles Antarctica. On a longitudinal basis these areas of low frequency occur near 55° W. in the South Atlantic Ocean, 50° E. in the Indian

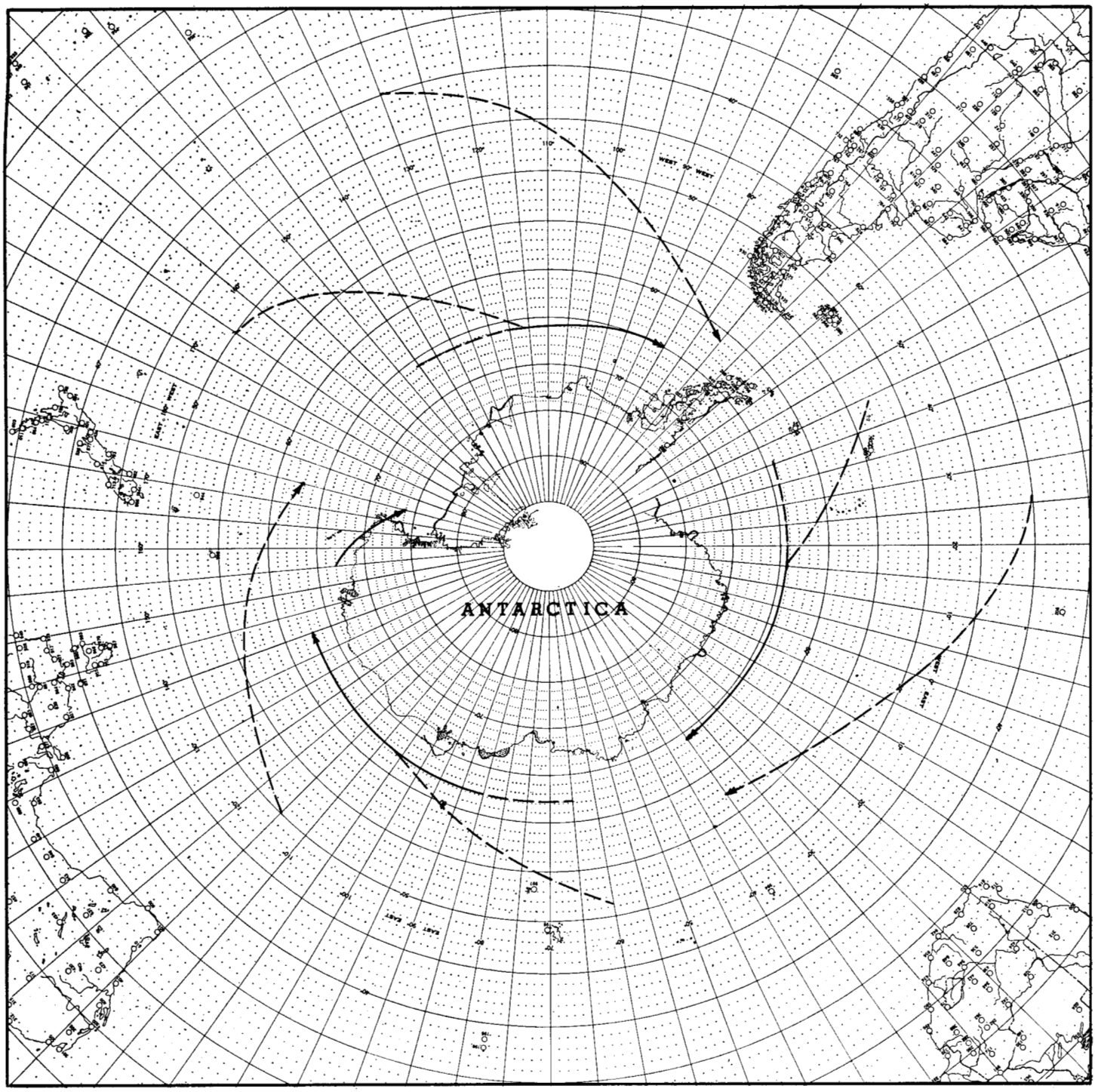

FIGURE 1.—Principal extratropical cyclone tracks in the Southern Hemisphere (February-March). The prevailing direction of motion of cyclones is indicated by the arrows. Heavy solid lines denote primary tracks; dashed lines denote secondary, less frequent, and less well-defined tracks. Arrowheads end in areas where cyclone frequency is a local maximum. Storm tracks that originate outside of the circumpolar trough may actually begin farther to the west or northwest. Such arrows begin slightly east of the source region where the track has become more clearly defined.

Ocean, and 160° W. in the South Pacific Ocean. These areas are better defined in the fall and early spring months than in other seasons, except in the South Pacific Ocean where the storm frequency is low within the circumpolar trough, in the area between 100° and 160° W. longitude, all through the winter season. This is the Southern Hemisphere region and season with the least observations, so the reality of the above exception is open to question.

These low storm frequency areas may be preferred regions for polar outbreaks and agree in location with

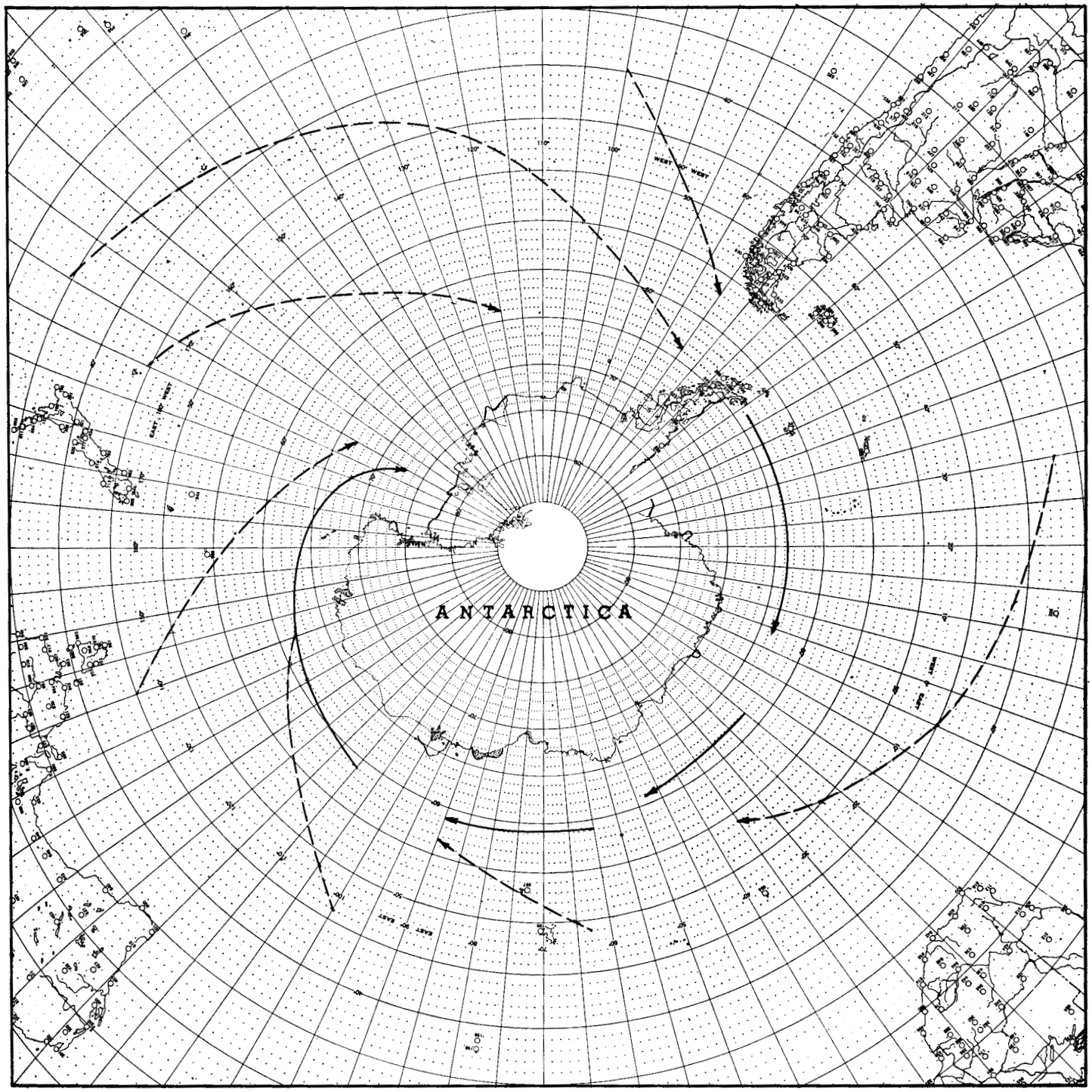

FIGURE 2.—Principal extratropical cyclone tracks in the Southern Hemisphere (June-July).

areas outlined by van Loon [4] where stagnating high pressure systems that persist for at least 6 days are most likely to occur.

For relevant literature on Southern Hemisphere circulation problems the reader is referred to papers by Court [5], and Rubin and van Loon [6]. These storm tracks may be compared with those of the Northern Hemisphere (Klein [7]).

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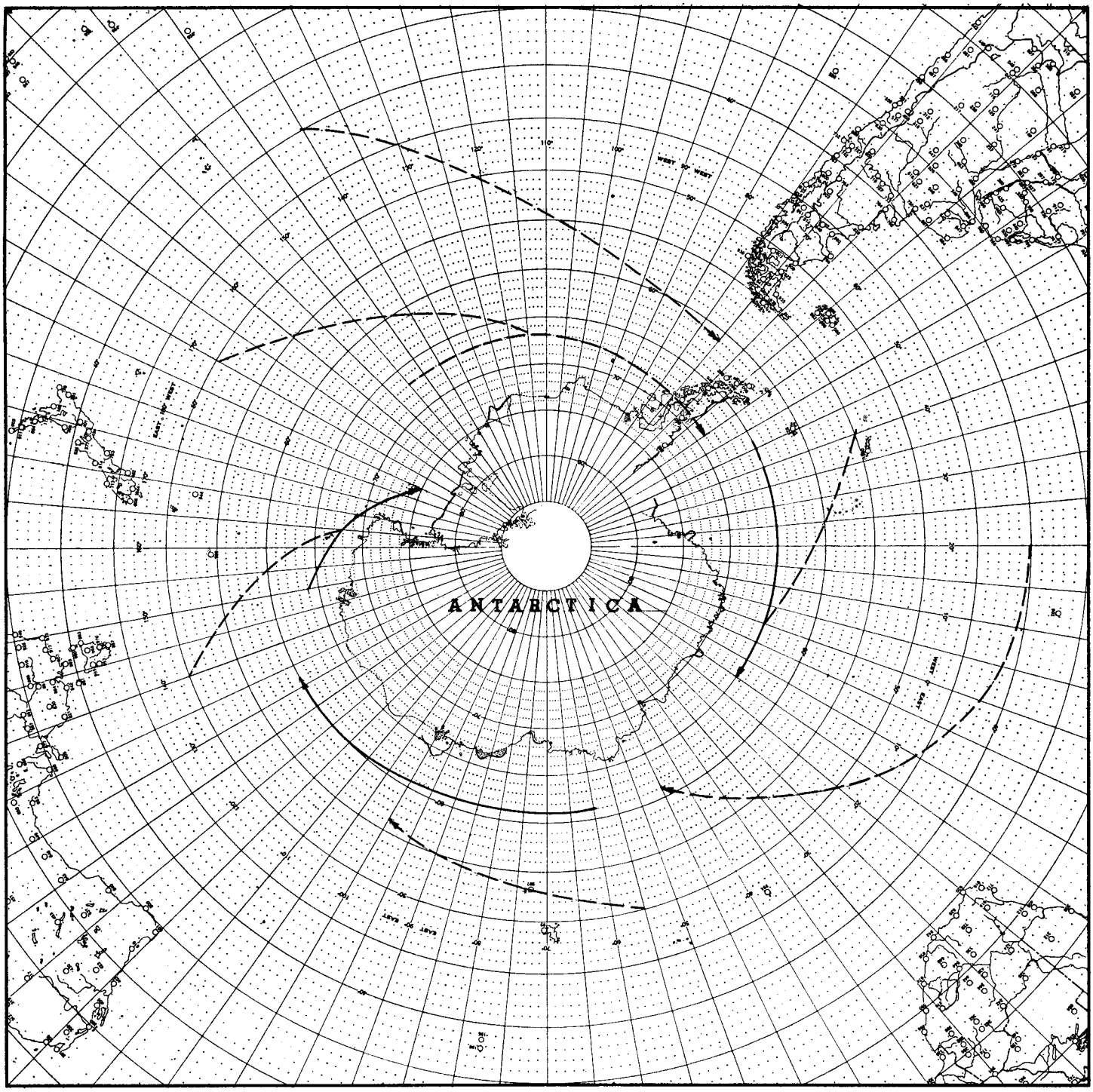

FIGURE 3.—Principal extratropical cyclone tracks in the Southern Hemisphere (October-November).

3. E. Vowinckel, "Zyklonenbahnen und Zyklonengenetische Gebiete der Südhalbkugel," *Notos*, vol. 2, Nos. 1/2, 1953, pp. 28–36.
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